C1850-2
4/4/89 A

SIX DOLLARS

A CAHNERS PUBLICATION

Electronic Business

FOR MANAGEMENT IN ELECTRONICS, COMPUTER & SYSTEMS COMPANIES — WORLDWIDE

APRIL 3, 1989

From left to right: Gateway Design CEO Prabhu Goel, Mips CEO Robert Miller, Weitek president Arthur Collmeyer

BIG LESSONS FROM SMALL COMPANIES

Solid strategies from the little guys

PAGE 32

No inflation fears for high tech PAGE 17

Hard sell: Chip makers vs. Detroit PAGE 100

Electronic Business

FOR MANAGEMENT IN ELECTRONICS, COMPUTER AND SYSTEMS COMPANIES — WORLDWIDE

VOL. 15, NO. 7 APRIL 3, 1989

COVER STORY/MANAGING RESOURCES

32 Big lessons from small companies

The stereotype of the small electronics company — of the maverick engineer laboring far into the night in a California garage — is no longer accurate. Today's U.S. electronics entrepreneurs show remarkable clear-headedness when it comes to business. They have a keen sense of timing, a feisty opportunism that has already put them on fast growth paths, and a nimbleness that they insist on maintaining. ELECTRONIC BUSINESS details how the strategic thrust of three of these small firms may have applicability far beyond their small size.

PAGE 32 Small electronics companies are big on management savvy

BUSINESS TRENDS

17 High tech to economists: No fear of inflation

CFOs aren't lying awake nights brooding over inflation. They are figuring on a very acceptable year. High tech's cost picture is bright, principally because of falling DRAM prices.

24 Pre-ship sales receipts ease small firms' cash-flow jams

The prepayment system — getting paid by customers before having to pay suppliers — is a viable option for small electronics companies. Observers expect prepayments to gain popularity in the 1990s.

STRATEGIES

32 Big lessons from small companies

With their global deal making, partnering prowess and market focus, three young U.S. firms show that management savvy is no longer just for the electronics elite.

34 Mips Computer Systems

This vocal RISC evangelist makes a theme of partner power, hoping to become a one-stop RISC shop.

36 Weitek

The maker of number-crunching chips is more ambitious than it would admit. It carves niches where others don't go.

38 Gateway Design Automation

A technology-driven simulation star that is rising fast. Next, it must deal with the push toward integrated design solutions.

44 Adding AI smarts to software development

It has been slow going for most CASE vendors, but incorporating AI into tools to improve quality and reduce software development already is being pursued by Texas Instruments Inc. and others with good results. But the question remains: will AI jump-start the market?

MANAGING RESOURCES

75 At Rogers, the workers police production — and themselves

A growing number of companies are experimenting with non-traditional labor structures as a way to lower manufacturing costs. At Rogers Corp., customers are seeing good results from the interconnect firm's new teams of self-managing workers.

Cover photo Christopher Springmann

PAGE 17 High tech isn't losing sleep over inflation

PAGE 75 At Rogers, the workers police production — and themselves

PAGE 44 Aion's Harry Reinstein: There are advantages to programming in English-like rules

PAGE 100 Intel's Fred Phail: Growth rates for auto semiconductors are 10% to 14% annually

PAGE 83 U.S. firms battle the pirates of Taiwan

ASIA/PACIFIC BUSINESS

83 **U.S. firms battle the pirates of Taiwan**
U.S. computer and software companies, tired of Taiwan's lackadaisical attitude toward intellectual property, have gone on the offensive.

MARKET PERSPECTIVES

91 **Power supply makers put the push on quality**
The power supply industry has been viewed by some as the "weak link" in the electronics chain. But power suppliers are seeking to change that.

100 **Silicon Valley and Detroit shuck off past animosities**
Detroit is starving for the technology that only Silicon Valley can offer, and carmakers and chip makers both can profit.

BUSINESS BAROMETER

139 **Revenue and profit indexes**
Revenue grew 12.3% in the last quarter of 1988, but profits fell 9.9% from year-ago levels. In 1989, the impact of input costs and export growth appears to be reversing.

140 **Leading indicator**
The rate of decline has been slow and the indicator may have flattened out in the early months of 1989.

DEPARTMENTS

5 **Inside Business**

9 **Upstarts**
International Integrated Systems, Performance Technology, Rosh Intelligent Systems

111 **Executive Viewpoint**
James Hammock, president of Silicon Compiler Systems, says start-ups that find success leveraging technological prowess ultimately will have to establish a corporate culture to mature.

120 **Comment**
M&A specialist Larry Cabaldon suggests aggressive acquirers make a mistake by overlooking strong management potential in companies they are acquiring.

128 **Coming Attractions**

133 **My View**
About the mistress. Contente Mens

134 **Advertiser index**

142 **Viewpoint**
Bartender: Another Yellow Peril chaser over here

COMPANIES IN THIS ISSUE

128 **An index of the companies covered in this issue.**

EDITORIAL STAFF

Publisher: Frank J. Burge

Editor: John Kerr

Managing Editor: Roger C. Plant

Senior Editors: Linda Stallmann (Financial), Anne Knowles, Bruce C. P. Rayner, Valerie Rice

Associate Editors: Barbara N. Berkman, Rick Whiting

Assistant Editors: Anthony E. Greene, John McCreadie, Xiong Xiaoge (China)

Section Editor: Marvin V. Greene

Copy Editor: Barbara Jorgensen

Editorial Assistant: Sherri Hartlen

Contributing Editors: Elizabeth Baatz (Cahners Economics), Euan Barty (Hong Kong), Dwight Davis (Boston), Madeline Franchi (Cahners Economics), Sarah Glazer (Boston), Shohei Kurita (Tokyo), Michael Leibowitz (Boston)

Consulting Editors: Alberto Socolovsky, Allen Furst (China)

Production Editor: Linda S. Cohen

Assistant Production Editor: Karen J. Covey

ART STAFF

Art Director: Bill Cooke

Staff Artist: Christina Rutter

EDITORIAL OFFICES

Boston: Cahners Building
275 Washington Street, Newton, Mass. 02158 (617) 964-3030 Telex: 94 0573 CPC BSN 6502502256 MCI Fax: 617-964-5490

San Jose, Calif.: Valerie Rice, John McCreadie
Sherman Building, 3031 Tisch Way, Suite 100, San Jose, Calif. 95128 (408) 296-0868

Irvine, Calif.: Bruce C. P. Rayner
18818 Teller Avenue, Suite 170 Irvine, Calif. 92715 (714) 851-9422

Northwest: Paula Doe
5011 133rd Place SE
Bellevue, Wash. 98006 (206) 641-0903

PRODUCTION

VP Production: Wayne Hulitzky;

Director of Production/Manufacturing: John R. Sanders;

Production Supervisor: Bill Tomaselli;

Production Manager: Betsy Harkins; (617) 964-3030

CIRCULATION

Group Circulation Manager: Eric Schmierer
44 Cook Street, Denver, Colo. 80206
(303) 388-4511

Total Circulation: 77,804

REPRINTS

ELECTRONIC BUSINESS articles are available on a custom printing basis at reasonable prices. Contact Joanne Westphal, Cahners Reprint Service, Cahners Plaza, 1350 E. Touhy Ave., PO. Box 5080, Des Plaines, Ill. 60018 (312) 635-8800
Electronic Business can be purchased on 35mm microfilm through University Microfilm Int. Periodical Entry Dept., 300 Zeeb Road, Ann Arbor, Mich. 48106

Artistic excesses

We're proud of our artwork and graphics around here. We're especially proud of some of our covers, and this one is arguably our most striking ever.

So it's not inappropriate to hand the credit to our art director, Bill Cooke — that's him in the picture. We usually use this column to host our writers, but Bill deserves this space because he has gone to great lengths to back our small companies story with visuals that ram home the point. Given the editorial theme — that small electronics companies have solid strategies for success that many big corporations would do well to note — Bill opted for the stark drama of smaller figures against a bright white background, with primary colors as accents, and props, such as the ladder, as cues that hint at the small companies' direction.

But Bill's creativity would have been wasted if it hadn't been translated onto film by photographer

Chris Springmann, photographer

Bill Cooke, senior art director

Chris Springmann — also pictured. Springmann is one of the best practitioners of the art that we know; we like him because he loosens up stiff electronics execs, stage managing the proceedings like a movie director, yet ever mindful that senior managers don't have time to be utterly frivolous.

This shoot was no exception. At Bill's direction, Springmann rented a much-bigger-than-usual studio, assembled the props and had them spray painted in primary colors. But when he couldn't find neckties to match those hues exactly, he spray-painted the ties, too. He had the three execs tie their ties, then he snipped them free at the back, painted them, let them dry, and had the subjects put them on again — this time pinned in place.

Now that's what I call giving 100%. We think that the result is extraordinary. We hope you do too.

JOHN KERR, editor

ELECTRONIC BUSINESS® (ISSN 0163-6197) is published bi-weekly, except monthly in December, by The Cahners Publishing Company, A Division of Reed Publishing USA, 275 Washington Street, Newton, MA 02158-1630. Terrence M. McDermott, President; Frank Sibley, Group Vice President; Jerry D. Neth, Vice President/Publishing Operations; J.J. Walsh, Financial Vice President/Magazine Division; Thomas J. Dellamaria, Vice President/Production and Manufacturing. Circulation records are maintained at Cahners Publishing Company, 44 Cook Street, Denver, CO 80206-5800. Telephone: (303)388-4511. Second-class postage paid at Denver, CO 80206-5800 and additional mailing offices. POSTMASTER: Send address corrections to ELECTRONIC BUSINESS® at the Denver address. ELECTRONIC BUSINESS® copyright 1989 by Reed Publishing USA; Saul Goldweitz, Chairman; Ronald G. Segel, President/C.E.O.; Robert L. Krakoff, Executive Vice President; William M. Platt, Senior Vice President. Annual subscription rates for non-qualified people: USA/Canada/Mexico, $69.95 per year; other countries, $110 per year (including air freight), $210 per year for air mail. Except for special issues where price changes are indicated, single copies of regular issues are available for $10.00 (USA, Canada/Mexico and foreign). Please address all subscription mail to Eric Schmierer, 44 Cook Street, Denver, CO 80206-5800. Cahners Publishing Company, A Division of Reed Publishing USA • Specialized Business Magazines for Building & Construction • Manufacturing • Foodservice & Lodging • Electronics & Computers • Interior Design • Printing • Publishing • Industrial Research & Technology • Health Care • Entertainment. Specialized Consumer Magazines: American Baby • Modern Bride.

VBPA ABP

Power supply makers put the push on quality

Vendors are being driven by customers to increase quality — and some are doing it. Field MTBF could go as high as 1 million hours

BY JOHN McCREADIE

While the power supply industry traditionally has been perceived by many as unglamorous, and even viewed by some as a "weak link" in the electronics chain, power companies are surging forward to dispel those negative perceptions once and for all.

The weak link perception stems mostly from high failure rates commonly accredited to power sources. As a result, merchant power suppliers are trying to change customer views by increasing product reliability, mostly by seeking better components and investing more in product testing. Part of shaking those negative perceptions, however, may depend on something unfamiliar to many power supply companies — aggressive marketing. Many manufacturers, due mostly to an industry shift from engineering to customer-driven designs, are putting more emphasis on product marketing.

And despite an already power saturated U.S. market, a few foreign companies continue to make headway here. This is keeping U.S. manufacturers, still eyeing low-cost offshore manufacturing sites, on their toes, causing some well-established industry names to even rethink their strategies.

Industry consolidation

As the industry continues to mature, consolidation, likewise, endures, occurring in some high places during 1988. Most significant is Unitech Plc's acquisition of Veeco Instruments Inc., the parent of one of the most recognized names in world power supplies: Lambda Electronics. But is continuing industry consolidation a preface to a shakeout?

The overall outlook for the industry is modest growth into 1990. Currently, worldwide consumption of power supplies is forecast to grow 8% to $13.5 billion this year (of which about $5.5 billion is merchant business), up from $12.5 billion in 1988, says Mohan Mankikar, president of Micro-Tech Consultants, a San Francisco-based market research firm specializing in the power supply industry. But Mankikar warns the worldwide growth rate may appear higher because of the dollar's weak exchange rate during 1988.

Domestic consumption is growing at a similar rate, from $5.7 billion in 1988 to $6.1 billion in 1989. The merchant market, which increased 3% over 1987, has gained most of its growth from offshore manufacturing, says Mankikar. However, echoing concerns of economists who predict a downturn in the computer industry early in the next decade, Mankikar says lean times may be on the horizon for power suppliers that, as a whole, have become very dependent on that industry.

Problems surrounding product reli-

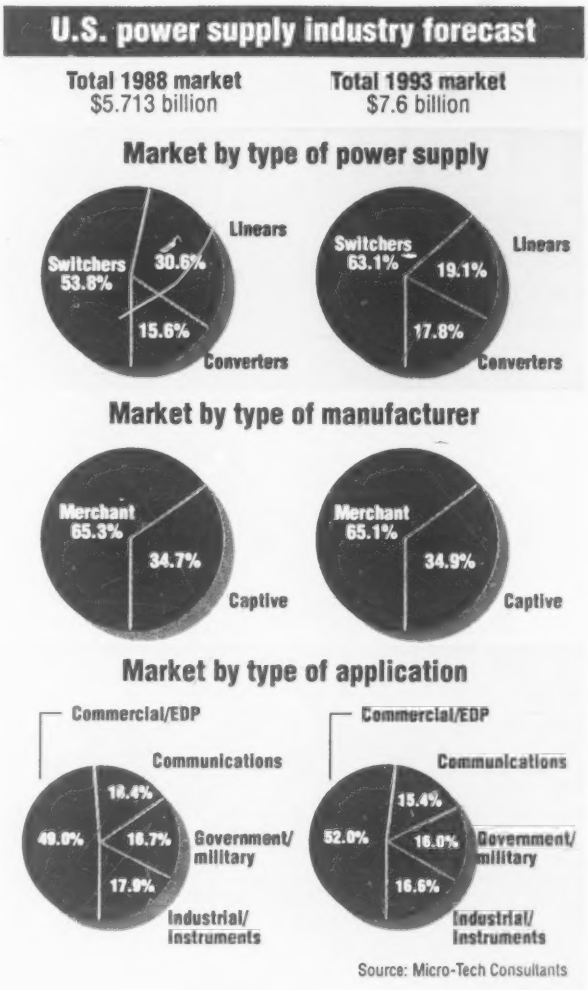
Martin Cooke

Lambda's Irving Gutman: The "merger" with British Unitech will give Lambda a strong position for taking advantage of the 1992 unification of Europe

ability are not unfamiliar to power suppliers, a major reason some consider the industry a weak link. The problem was compounded in the early 1980s as the industry shifted from linear to switching power sources, causing failure rates to increase — a "universal toe-stubbing," as one observer described it.

But power suppliers claim that both calculated and field mean-time-between-failure (MTBF) rates have increased substantially. Average field or observed MTBF, total operational hours divided by total number of failures, has increased from about 100,000 hours four years ago to a range of 300,000 to 600,000 hours, estimates Bruce Hamilton, vice president for marketing and engineering for ACDC Electronics of Oceanside, Calif. He adds that 1 million hours field MTBF will be achieved in the very near future.

Power suppliers are certainly being driven to increase reliability, not only because their customers are demanding it, but also because of the cost reduction in having lower return rates. Thus, price considerations are taking a backseat as manufacturers scramble to ensure greater product reliability.



To accomplish this, power supply makers report aggressive programs designed to qualify reliable component vendors right from the get-go. Qualifying vendors, a method imported from Japan, is helpful because "it puts the burden of responsibility for shipped parts on the supplier rather than on incoming inspection," reports industry researcher Mankikar.

Closing the weak link

Such vendor qualifying has led power suppliers to narrow their component vendor bases and create stronger long-term relationships. Likewise, power manufacturers report they are also working more closely with their customers early on in the design cycle, a process many say will help alleviate the "weak link" perception. "We feel we can become part of our customer's design team," says Norm Berkowitz, president of sales for Power Conversion America (PCA), a division of Computer Products Inc. (CPI).

Laptop maker Grid Systems Corp. of Fremont, Calif., buys AC/DC high frequency switcher power supplies from about six manufacturers, but declined to give names. Grid's senior vice president for operations Chuck Waggoner reports working closely with his firm's power suppliers in a complex screening process to ensure both the company and its products are reliable. "We had to make some changes in the past because vendors were not reliable," he says, a decision not made lightly in view of the extreme time and cost Grid invests in finding and working with new vendors.

Extensive testing and process screening are increasingly important to power supply builders, but costs are high. Screening Systems Inc. of Irvine, Calif., a manufacturer of vibration screening units used on production lines to find product flaws early on, reports an increasing number of its customers are from the power supply industry. The equipment cost: $70,000 to $200,000.

Still others are employing more traditional methods, such as employee incentive programs. Unipower Corp. of Pompano Beach, Fla., a CPI spin-off that makes encased medium- and high-wattage power converters, holds weekly employee quality meetings and is organizing an employee incentive program aimed at customer service.

In an industry where long warranties are sometimes offered merely to enhance the image of quality, manufacturers are now going to great lengths to prove product integrity. Qualidyne Systems Inc., one of Unitech's holdings, uses its track record to convince future buyers of product reliability, insisting new customers call past customers in addition to reviewing in-house test and burn-in results.

One impetus for improving quality may be increasing competition from foreign manufacturers. Hong Kong-based Astec U.S.A (HK) Ltd. has increased its revenue in the United States 35%, from $96 million in 1987 to $130 million last year. Japan-based Shindengen America Inc., which for the past two years has inched its way into the U.S. market, will be focusing its efforts on market niches in the industrial and instrumentation markets. "We're also looking at the workstation market," says Peter Gajewski, vice president for

sales and marketing for Shindengen.

Meanwhile, some U.S. companies are changing their strategies in an effort to be more competitive. The most dramatic change is a restructuring undertaken by PCA. In the early 1980s, CPI had tremendous momentum, acquiring strong power suppliers like Boschert Inc., but stumbled severely in 1986 and 1987, reporting net income losses of $8.8 million and $11.3 million, respectively.

Moving its operation base in late-1988 from Pompano Beach to a more strategic site in Fremont, Calif., PCA eliminated many products and consolidated divisions to streamline its operations, reduce costs and bring the company back to profitability. This cost an estimated $6 million.

Many custom power suppliers are moving into standard switchers and converters. Astec is making such a shift to broaden its product offering in the PC market, although its main business will remain in the custom arena. Likewise, ITT Power Systems views offering a few standard products as a way to enhance its custom business, a kind of modified standard approach.

In an attempt to stay competitive, U.S. manufacturers are forever eyeballing additional offshore manufacturing locales to keep their products price competitive. For manufacturers such as Zenith Electronics Corp. and ACDC, Mexico has been a hotbed for low-cost manufacturing that offers relatively easy transportation channels into the United States. And CPI, which manufactures in Hong Kong, is seriously looking to Mexico and the People's Republic of China as possible manufacturing sites, while others tout Thailand as the newest "in" spot to build.

Global giant

Consolidation has been occurring in this industry for the past several years, not surprising considering there are, by official accounts, more than 400 power supply companies. Unofficial estimates claim upward of 1,000 power-related companies actively doing business in a market in which no one company has more than a 7% market share.

The acquisition of Melville, New York-based Lambda by Unitech of Reading, England, is one of the most significant unions in the history of the industry, creating a worldwide giant in power supplies with combined revenue totaling $270 million for 1988. Still, the teaming is only a small ripple in the worldwide market, grasping at a market share of less than 5%. (Note: Revenue figures for Unitech and Lambda are charted separately because the acquisition occurred after fiscal year 1988.)

Price considerations are taking a backseat as manufacturers scramble to ensure greater reliability

Unitech, a name slowly gaining more recognition in the United States, is a conglomerate of 32 companies with annual revenue of more than $400 million. Unitech holdings Coutant Electronics Ltd. and Weir Inc. are well-established power suppliers in Europe with combined revenue of $44 million. In the United States, Qualidyne is a $16 million company that mostly sells standard products to OEMs.

Irving Gutman, Lambda's group vice president for marketing and sales, calls the Unitech acquisition a "merger," and says all of the Unitech power supply units will combine research efforts and market each other's products. The Unitech/Lambda teaming captures all of the major markets and especially gives Lambda a strong position for taking advantage of the 1992 unification of Europe. So, what other markets are left to be conquered? Says Gutman: "I'm trying to make my connections in the Soviet Union now that they seem to be opening up."

Even with Emerson Electric Co.'s latest acquisition of Powertec Inc. of Chatsworth, Calif., at the end of last year, most industry observers say a shakeout is unlikely. "I think the small guys are going to keep spawning," says Bob Wakefield, president of ITT Power Systems Corp. "The cost of entry into this business is so small and a key characteristic among buyers is they will buy from the small guy."

Still, others see investment costs for start-ups increasing because of more complex designs and testing. Thus, customer-driven demand for greater quality may be the ax that will sever easy market entry. "The investment level required to be in business long term is high," says ACDC Electronics' Hamilton. "Reliability — do you think that comes free?"

Although many power suppliers are making an honest effort to improve reliability, some fly-by-night operations are bound to exist in a market as big as this. Because of extreme fragmentation and few power industry standards, those reliant on power suppliers will have to use caution when chosing a vendor, weighing both quality and price, and performing testing of their own. But a major industry shakeout, say some observers, may be the only way of eliminating less quality conscious manufacturers and moving closer to creating some viable industry standards. □

Top power supply manufacturers

Fiscal year 1988 sales ($ millions)	Total power supplies		AC/DC switching power supplies	
	Worldwide	U.S.	Worldwide	U.S.
Astec	$215	$130	$195	$105
Lambda Electronics*	205	97	164	78
Shindengen	186	2	142	2
Tamura	130	13	45	11
Computer Products	102	85	65	55
CEAG	80	25	68	23
Emerson	80	77	75	70
Zenith	70	56	70	56
ITT Power Systems	65	60	65	60
Unitech*	62	15	49	12

* Unitech's acquisition of Lambda took place after fiscal year 1988

Source: Micro-Tech Consultants

Silicon Valley and Detroit shuck off past animosities

Semiconductor firms fashion a new business attitude toward automakers in order to cash in on a growing market desperate for the technology

BY JEFFREY ZYGMONT

Semiconductor companies do almost anything to please their automotive customers. They kick in extra money for product development; they speed up chip production; they even make a point of delivering shipments on time. It's a new attitude for chip makers. In their first 20-odd years, these youthful companies have enjoyed a charmed, collegiate sort of business style. After all, they create the technology that leads to so many nifty new things, from faster computers to tinier pocket calculators.

But doing business with auto companies is like growing up, graduating, and going out to face cigar-chomping deal makers who don't care if you're missing spring break down at Fort Lauderdale. Carmakers aren't won by technology advances the way other big semiconductor customers are. They have their own rules. They want electronics that are custom designed for cars, that work both in subarctic and super-tropical temperatures, that stand up to a decade of exposure to grease, water, soot and vibrations. And they want some homage and servitude, a little bit of healthy groveling. "They expect us to pay them for the privilege of selling parts to them," summed up one electronics supplier.

Fred Phail, Intel's marketing manager for automotive electronics: "The growth rates for automotive semiconductors are in the range of 10% to 14% annually"

Tom Gerczynski

It's a whole lot easier selling to computer companies and their ilk, which understand and even appreciate the ways of the semiconductor industry. Yet Silicon Valley is sticking by Detroit, taking its tactics like a spoonful of medicine. That means struggling with a rust-belt procurement process that is itself in a violent upheaval as auto companies shuck off their old, adversarial approach to suppliers and shop for "strategic partners" that will help them design and build better cars. The semiconductor companies winning the contracts are doing it by tailoring special operations around the needs of auto companies, working toward closer cooperation, even learning about the likes and dislikes of people who buy cars. In a spirit of conciliation, some electronics executives even concede that their own haughty, technological smugness fanned the animosity between their companies and the Big Three automakers, General Motors Corp., Ford Motor Co. and Chrysler Corp.

They want not just a truce, but an alliance. For electronics companies, automobiles represent a growing market that's stable and predictable, without the crippling swings in demand that plague many newer, hotshot products. "Maybe you can't grow 50% in one year like you can in the computer industry, but you won't drop 30% the next year if sales are off," explains Mike Eisele, automotive programs manager for Intel Corp.'s automotive operation in Chandler, Ariz. Not only are the peaks and troughs in auto demand much less severe, they also run oppo-

John Stark, manager for purchasing for Delco Electronics: The 12- to 20-week chip fabrication time remains a big headache

site those in other electronics markets. Thus, chip makers expect automotive electronics to dampen their more volatile markets.

But more than that, automobiles are simply a large market that's getting bigger all the time. "The growth rates for automotive semiconductors are in the range of 10% to 14% annually," says Fred Phail, Intel's strategic marketing manager for automotive electronics. His company expects the worldwide automotive semiconductor market, excluding discrete devices, to reach $4.7 billion by 1995. In North America alone, Intel expects automotive semiconductor consumption to reach $1.4 billion in 1991. In 1987 it totaled about $900 million.

Growth in chassis systems

Since computerized engine controllers were first used in the United States in 1976, automotive electronics have spread rapidly. Today, virtually every U.S. car has at least an engine computer. Many have additional microprocessors embedded in radios and climate control systems; in trip computers that help drivers figure distances and fuel consumption; in controllers for transmission, brakes, instruments, steering, rearview mirror; even for six-way power seats. Much of the growth will be in chassis systems — features that affect the way a car rolls, stops, takes bumps and handles turns. Under development are collision avoidance systems, traction controllers that prevent wheels from slipping during quick getaways, even active suspensions, which replace springs with hydraulic rams that position wheels in response to a computer that senses road irregularity. All in all, electronics promises to redefine auto locomotion, and Silicon Valley is outright dizzy at the prospects. Semiconductor and electronics companies now rank among the most outspoken automotive visionaries.

However, Detroit's approach has been tempered by caution. First, there is the problem of history. Compared with electronics, automaking is an ancient art. Car designers and engineers work wonders with metal; manipulating electrons on a slice of silicon is still black magic to many of them. Further, carmakers have a neurotic concern for safety and reliability, the two qualities motorists demand above all others. Therefore, they submit new semiconductor products to painfully slow testing and evaluation. A supplier can expect a three- to five-year wait before finally getting the go-ahead to start mass producing a new chip, a long wait before finally cashing in its investment — the supplier typically has to pump in additional money to keep the program alive through the evaluation.

Competitive weapon

Caution notwithstanding, automobile companies desperately need electronic technology. At the start of the decade, precise, computerized engine control was the only way they could meet federal regulations. Today, advanced electronic features are a powerful competitive weapon in a market battle that's getting fiercer all the time. Automakers want electronics to make their cars work better than the competition's.

"In the past four years, automotive companies have made tremendous advances in understanding electronics," says Ron Souter, U.S. marketing manager of Intel's automotive operation. Still, their expertise is strongest when it comes to moving metal — involving technologies that electronics companies know nothing about. Thus, the two sides are joining in partnerships that allow them to tap the strengths of the other.

For car companies, partnerships aren't unique to electronics suppliers. Since the early 1980s, U.S. automakers have been diligently revamping their vast supplier networks, getting rid of many and strengthening bonds with those they keep. In many cases, car companies are asking suppliers to participate in mutual engineering projects, in which the supplier gets an early say in how a component or system should be designed. That's particularly important in electronics. The technology is fast-changing and very complex, especially when applied to automobiles. Therefore, it requires a high level of intellectual exchange, explains Robert Parker, a 16-year Ford veteran who now heads the consulting agency Parker Management Associates in Wheaton, Ill.

Beyond chip makers, the Big Three are relying more and more on the electronics expertise of companies like TRW Inc., United Technologies Corp. and Robert Bosch — old-school suppliers that are experts at wedding electronic control to moving parts. "The automobile will always be a mechanical device. It will never have electronic tires," illustrates D. Richard Harmon, TRW vice president and general manager of the

Tod Martens

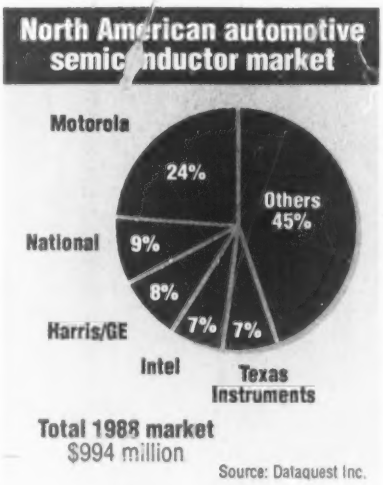
transportation electronics division in Farmington Hills, Mich. TRW incorporates electronics into many of the $3 billion worth of parts it sells annually to car companies around the world, including occupant restraint systems, steering assemblies and even electric switches.

Fewer suppliers

Delco Electronics, the subsidiary of General Motors, has cut its number of suppliers of electronic material — everything from integrated circuits to plastic housings — to fewer than 500. It will reduce the number further, to around 400, says John Stark, manager for purchasing. "It's a matter of refinement now," he explains. That's good news for the suppliers who make it. For example, one company now supplies all capacitors for the 4 million cars GM manufactures each year; in the early 1980s, seven did. "Think of the volume — it's unbelievable," marvels Mike Doyle, director of world automotive marketing operations for Motorola Inc.'s Semiconductor Products Sector in Phoenix.

Even better, suppliers on the inside get a lock on future business. For one thing, the automaker becomes accustomed to working with them. Also, once its semiconductors are designed into cars, they can't always be easily replaced by another company; the competitor's underlying chip architecture may differ. It's not like buying a fender, in which any metal bender's product can match another's. "The companies that have had consistent relationships have a very good advantage," observes Intel's Eisele. "If you're not in, it's very hard to break through."

But establishing and maintaining a consistent partnership with a U.S. automaker takes a lot more than a handshake. Auto companies expect their partners to stay on top of technological advances, to participate — even help fund — joint development projects, to make ongoing efforts to cut costs and improve efficiency, to set up elaborate just-in-time delivery schemes, and generally to demonstrate unwavering support. "A contract doesn't make a partnership at all," explains Dale Spoon, automotive operations manager for Texas Instruments Inc. "Partnership is a philosophy and a methodology that we're operating under. It requires patience and a fair amount of up-front investment."



At times that's not enough. "The car people resent the fact that there is this enormous invasion of electronics into their products," says Parker, whose consulting firm specializes in managing relationships between supplier and customer. In February, his book on the subject, *Beyond Negotiation*, coauthored by John Carslyle, was published by John Wiley & Sons. "Automotive buyers attempt to treat the electronics industry as a rust-belt industry," he observes.

For electronics firms, automobiles represent a market that's stable and predictable

Car companies haven't yet demonstrated enough of the openness they say they're extending to suppliers, claims Parker. Rather than letting semiconductor companies participate in development, carmakers still sometimes hand over a finished design and expect chip fabricators to simply follow orders. "There's more stated partnership than real," Parker says.

That's partially due to the shadow of its past procurement practices, under which the Big Three ruled with an iron fist. Typically, contracts went to the lowest bidders and new bids were solicited each year. When you won a contract, "you didn't have long to sleep because next year you had to go through the same process and maybe lose the contract to a competitor," recalls Doyle, who worked for Ford before moving to Motorola.

"The internal incentive system isn't yet keyed to partnership," says Parker. For instance, the Big Three generally still reward their buyers for negotiating tough, low-price contracts, sometimes ignoring factors that make for strong partnerships.

Of course, automakers don't shoulder all the blame. "Semiconductor companies tend to send signals that they have a lack of patience with these metal benders. They have a technical arrogance," Parker says. But when performance measures are applied, chip makers fall short. Motorola ranks tops among Ford's chip suppliers, yet when compared with all Ford suppliers, the chip maker is near the bottom of the heap. "The electronics industry has a demonstrably bad reputation for failing to deliver what they've promised," charges Parker.

Delivery problems

Delco's Stark says the 12- to 20-week chip fabrication time remains a big headache, due especially to unpredictable schedule changes that result from swings in consumer demand. The problem, he says, is that semiconductor companies typically ship chips to the Orient for lower cost final assembly. "A lot of that time is just for transit," he complains. Some electronics companies are devising automated final assembly operations that may beat the cost of foreign labor.

Delivery problems creep up again and again in discussions both with carmakers and chip suppliers. Car companies want to feed their assembly lines with a steady flow of parts. But semiconductors aren't made in steady streams; they're processed in batches. Irritating delivery snaps result.

When you add it all up, says Parker, "the key problem is a lack of trust," because each side has been burned by the other.

But electronics companies are learning that they can be successful with the automakers by tailoring operations around their needs. Most have created special automotive op-

erations within their companies, which operate differently than other company divisions. In 1982, for instance, Intel's automotive sales were handled by a focus group. By 1984, car business was elevated to an operation, which is an independent profit and loss center. Last year it was made a full-blown division within the company's embedded controller group. Because of the demands of the division's customers, "it's setting a model within Intel on how to effectively, continuously improve every aspect of our business," says Phail.

Motorola — the largest U.S. automotive semiconductor supplier with about a quarter of the North American market, maintains a flexible warehouse system that allows it to fill orders promptly and react to schedule changes. At National Semiconductor Corp. and Texas Instruments, special production planning departments anticipate the product needs of automobile customers and manage safety stocks to assure prompt delivery. "You must have the product they want when they need it, or they lose their sense of humor very quickly," quips Paul Standish, director of automotive marketing for National Semiconductor.

As part of its quality assurance and reliability program, National Semiconductor stations a person in customers' factories. "That's been instrumental in helping us achieve the business levels we now have," says Standish. Working with the plant's quality control staff, National Semiconductor's liaison heads off problems early. This often means correcting simple communication screw ups. Perhaps an incoming shipment is about to be rejected because it doesn't match the paperwork at the factory; The liaison may find that the parts incorporate an engineering change that reached National Semiconductor but not the factory. The problem is solved.

Texas Instruments spent about 18 months setting up a customized delivery system for the new Huntsville, Ala., plant of Chrysler's Accustar component division. The two companies' computer systems are linked, allowing Chrysler to check on the whereabouts of shipments. Texas Instruments gets a peak at Chrysler production plans, helping it anticipate its customers' needs. "We may have to react within hours" of production schedule changes, says Spoon.

All in all, electronics promises to redefine the concepts of auto locomotion

In short, suppliers must be willing to spend money to support their automobile customers. That's especially true in the development of new products. With a three- to five-year development span, "a lot of things can happen along the way," says Souter of Intel. "There is a higher element of risk, both in the qualification of the product and in the chances that the program may be canceled by the automotive company. We've had a number of instances where that's happened."

The trick is learning to be a market-driven company, something new for chip fabricators. Observes National Semiconductor's Standish: "Semiconductor technology has historically driven the computer marketplace. It does not drive the automotive marketplace." Thus, chip makers must learn what carmakers want, which equates to understanding what car buyers want.

Intel aims to do this by joining with Ford, its best customer, in a procedure called quality function deployment. Basically, each side deploys the functions it does best toward a mutual goal, in one case the development of a new erasable-programmable read-only memory chip. Both Ford and Intel assign people to the team, which operates in a brainstorming environment focused on evaluating what car customers want, then delivering it.

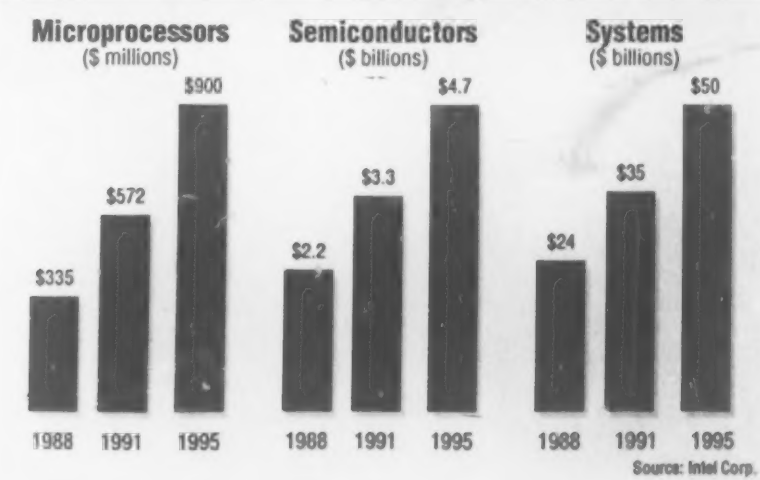
Cooperative efforts

Although problems remain, both sides seem to be making sincere efforts at cooperation. "There's no way around it: You end up having to trust," observes Motorola's Doyle. "Suppliers have to understand the underpinning pressures affecting the auto companies so they can understand the actions of these big firms," he says.

Eventually, Detroit will become an easier place to do business. "Different companies and even different divisions witnin the same company are in different positions along the spectrum of change, but they are all on the same mission," according to Doyle.

Still, the greater onus for change rests on the semiconductor makers. "The industry has accepted the fact that we have to do business the way the customer wants it," says National Semiconductor's Standish. Ask any college kid working the mall during summer vacation — the customer is always right. □

Worldwide automotive electronics market

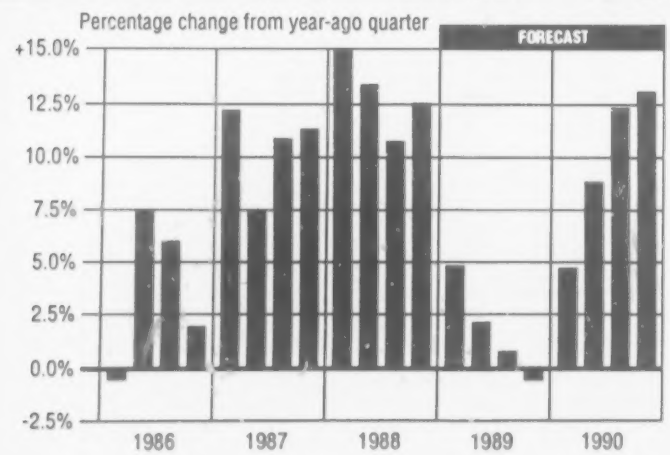


Source: Intel Corp.

ELECTRONIC BUSINESS indexes

Historical data: ELECTRONIC BUSINESS; Forecast: Cahners Economics

Revenue growth for electronics companies



Historical data: ELECTRONIC BUSINESS; Forecast: Cahners Economics

Electronics companies' profits rise 3.2% in 1988

Gone are the days of double-digit profits growth year after year after year for the electronics industry. In a disappointing — but expected — fourth quarter performance, profits at electronics companies fell 9.9% from year-ago levels. After a 41% surge in profits in 1987, profits for all of 1988 rose only 3.2%.

While profit growth slowed, growth in electronics companies' revenue held steady. Revenue grew 12.3% in the last quarter of 1988 compared with a year ago. In 1988, revenue expanded a reassuring 12.7% on the heels of 10.3% revenue gains the year before.

The biggest squeeze on profits probably was due to one factor: Rapidly rising prices for memory chips put upward pressure on input costs at computer manufacturers. Some speculation that computer makers were unable to get enough supplies to meet demand may mean production that should have taken place last year didn't happen. Will that circumstance help boost computer production in 1989? Perhaps.

While input costs dragged profits down, export opportunities blossomed last year. Companies which had significant foreign sales were aided by the continuing fall of the U.S. dollar. More competitive foreign prices made U.S. electronics exports profitable, in addition to assisting in market share gains against local producers.

Slower growth ahead

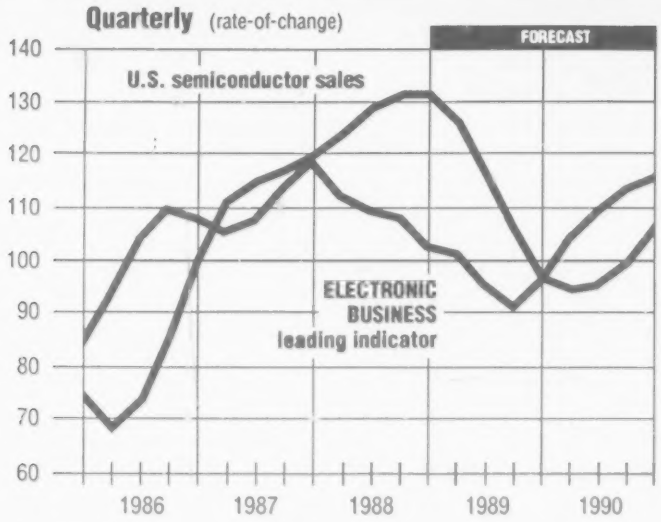
In 1989, the impact of input costs and export growth appears to be reversing. Profits are unlikely to plummet widely in 1989 or 1990, barring any serious industry recession. Business cycle dynamics dictate that profit growth cease in the latter half of 1989 or early 1990. Cahners Economics forecasts profits to drop 1%, with revenue growth continually growing, at a slowing rate this year.

The biggest drag on profit growth this year and next remains the persistent fear of recession. Stronger than expected growth so far in 1989 could be stealing from next year, putting the odds of a recession higher and higher, say many economists. Cahners Economics forecasts continue to assume average economic growth both this year and next.

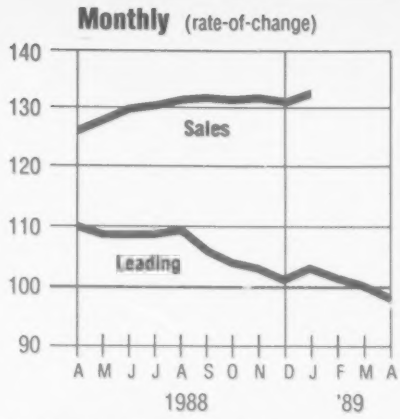
For electronics, the kind of overall operating environment should provide stability. And while stability won't provide any impetus for profits to surge to unimaginable heights or plummet to depressing depths, the industry should hold its own until the next wave of technology sends profits back up.

ELIZABETH BAATZ

ELECTRONIC BUSINESS leading indicator



The ELECTRONIC BUSINESS leading indicator predicts turning points in U.S. semiconductor sales with about a three- to nine-month leadtime. For more information please contact Elizabeth Baatz, senior economist, Cahners Publishing Co., 275 Washington St., Newton, Mass., 02158, or call (617) 558-4368



The ELECTRONIC BUSINESS leading indicator fell to 100.7 in December from a revised 102.8 the previous month. The rate of decline has been slow and the indicator may have flattened out in the early months of 1989. All the components of the indicator are dropping on a rate of change basis, but none as steeply as in 1985.

Source: Cahners Economics

Electronics industry indicators this month

	Latest month	Previous month	Year ago	1987 average
ELECTRONIC BUSINESS leading indicator (rate-of-change, Dec.)	100.7	102.8	117.7	111.1
U.S. semiconductor bookings ($ millions, 3-month average, Jan.)	$1,124	$1,066	$1,062	$951
Weekly hours of semiconductor production workers (monthly average, Dec.)	41.0	40.2	41.3	40.6
Electronic components leadtime index (1977 = 100, Feb.)	104.0	111.9	106.6	100.7
S&P's semiconductor stock price index (1970 =10, monthly average, Jan.)	49.0	45.8	53.2	65.5
Change in electronic components inventories ($ millions, SA, Dec.)	-$115	+$315	+$57	+$41
Contract and orders for plant and equipment ($ billions, SA, Dec.)	$43.2	$39.9	$38.0	$34.6

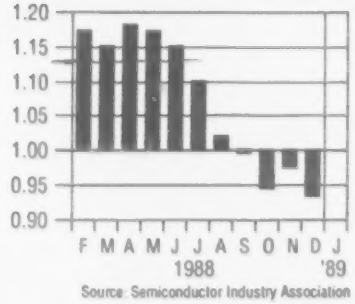
SA = seasonally adjusted, all other data is not seasonally adjusted

Sources: Semiconductor Industry Association, U.S. Bureau of Labor Statistics, *Electronics Purchasing* magazine, Standard & Poor's, U.S. Commerce Department, U.S. Bureau of Economic Analysis

Semiconductor sales

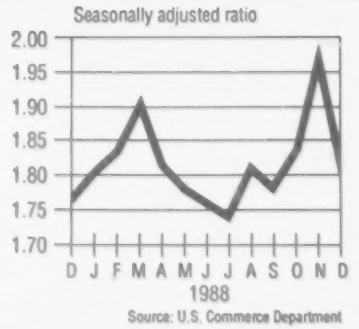
Source: Semiconductor Industry Association

Semiconductor book-to-bill ratio



Source: Semiconductor Industry Association

Component inventory-to-shipments



Source: U.S. Commerce Department